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Prospects for the use of Innovative Technologies in the Application of Heat Storage Materials

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Abstract: *In the article heat save ability has materials in use innovative technology, heat conductivity detection there is methods analysis to do and improvement on experimental research results described. It's not flat surfaces perfect in a way heat protector coatings coating, heat effective use methods illuminated.*

Keywords: *modern heat protector coatings, energy efficiency, heat conductivity, microsphere, heat protector coatings put requirements, liquid heat protector coatings advantages and application branches.*

Last The term "innovation" in the years a lot used words ranks. Innovation this - (ing. innovationas - included novelty, invention) meaning means. Energy save feature has heat protector materials Create and application in the process innovation role important importance profession reaches.

To our country heat protector materials since the demand to increasing is growing. This materials firm requirements based on prepared. They are first of all energy thrifty be small size yield lightweight, environmentally friendly clean, flexible, sound and to the noise durable, flammable lack of water and vapor - tight, steel products when pushed anti - corrosion, building and to buildings when applied heat loss reduce and from mold protection to do tribe enters. Right now functional remove and large industry in enterprises heat save stay, energy consumption reducing the work take to go current and one of the important issues is calculated.

Right now from the heat productive use and save for steklovatas (minvata) are used. On the example of urban thermal power plants seeing if we in the pipes heat save for initially gum (bitumen) is pushed then steklovata rope over tunic (zinc) is covered. These economic bias calculated much expensive and from time to time to lose take is coming.

We offer growing heat protector innovative material only building and structures, heat pipes maybe industry all networks the same can be applied take with raw attention deserves.

This material is the microsphere and acrylic paints (again) a how many chemical substances) prepared. High stickiness ownership how material the same brick, glass- glass, matell, plastic, gypsum, cement-sand areas, concrete, wood and etc.), cold surfaces corrosion yield be prevent take and how to the surface the same deposit with separated costs. Picture 1



Picture. 1 The heat-insulating coating adheres evenly to any material.

We know not flat surfaces heat protector materials cover much complex because the process surface unusual that is heat protector usual suitable for material (fiberglass) not. This is not covered the rest not flat surfaces disappearing heat calculated noticeable numbers we will come We are scientific research take growing innovative heat protector stay complex surfaces raw adapt takes. Picture.2



Picture. 2 Coating on surfaces that are considered complex

In addition to coating heating and engineering networks, technological pipes, heat energy and capacity equipment heat insulation, waterproofing, corrosion protection, construction constructions, accommodation place and manufacturing industry buildings i in facades, internal part of heat insulation, residential, industrial buildings (external and internal insulation), easy installation, metal structures (garages, containers), heating mains, pipes, ventilation ducts, shut-off valves (valves and valves), industrial containers, motor vehicles salons are designed for use in water transport.

First of all, we got acquainted with the heat-insulating coatings produced in foreign countries and imported to our country. This attention can be explained by the extremely low coefficient of thermal conductivity of these dyes produced. For example, the thermal conductivity of Corundum paints is 0.001 W / m 0^0 S, Bronya paint - 0.001 W / m · ^{0} C. Of course, such a thermal conductivity is superior to heat-insulating paints compared to conventional heaters (extruded foam polystyrene, mineral wool, etc.), therefore, the thermal conductivity of extruded foam polystyrene is 0.030 W / m 0^0 S ga teng.

The Tomsk State Institute of Architecture and Construction conducted an experiment on the method of GOST 7076-99. As a result of the work, the thermal conductivity of two types of paints was determined -

0.086 W / m 0^0 S and 0.091 W / m 0^0 S. These results are much worse than those given by paint manufacturers.

The thermal conductivity of corundum paint was determined according to TU 5760-001-83663241-2008 by the method M-001-2003, developed by the Research Institute of the Federal State Unitary Enterprise "Santechniki". The development of this method was due to the fact that ultra-thin liquid composite coatings based on glass, ayumosilicate, perlite and similar microspheres are not suitable for determining the thermal conductivity by stationary and nonstationary methods.

Volgograd State University of Architecture and Construction was engaged in determining the thermal conductivity of corundum paint. The technical conclusion based on the test results states that the methods for determining the thermal characteristics and the value of the thermal conductivity of the paint "Corundum" is 0.001 W / m 0^0 C.

The discrepancies between the results obtained can be explained primarily by the lack of normative methods for determining the thermal conductivity of new ultra-thin coatings obtained on the basis of microspheres. The structure of all such paints consists of grids of hollow microspheres interconnected with acrylic film-forming substances.

With this in mind, the value of the thermal conductivity of liquid thermal insulation coatings has aroused the interest of both consumers and researchers, resulting in many experiments to determine the thermal properties and effectiveness of these paints.

Under normal conditions, the thermal conductivity of air is 0.026 W / m 0^0 S, and the thermal conductivity of an absolute vacuum is 0 W / m 0^0 S. Air is the best natural heat retainer.

Determining the true thermal conductivity of liquid thermal insulation coatings is one of the urgent tasks at the present time.

Therefore, the Youth Center for Innovative Technologies of Fergana Polytechnic Institute conducts research on the introduction of modern thin heat-insulating coatings, determination of thermal conductivity and their improvement, and this innovative material can solve the above problems.

Based on the analysis of the available methods during the experiments, it was envisaged to replace the heat meter with a layer of material with a clear thermal conductivity using a standard method of determining the thermal conductivity of liquid thermal insulation coatings. Such a substitution does not contradict the theory of the study of thermal processes.

Procedure for determining the thermal conductivity of thermal insulation coating:

The thermal conductivity of the liquid thermal insulation coating was calculated according to the following formula:

$$\lambda = \frac{d_u}{\frac{\Delta T_u}{q_u} - 2R_L},$$

Here d_u - sample try in time thickness, m;

ΔT_u - being tested sample surfaces temperatures difference, ^{o}S;

q_u - being tested sample passing stationary heat flow density, W / m ^{2};

R_L - being tested sample (paint) coated copper plate thermal resistance, (m $^2 \cdot {}^o$ S) / W

For example passing stationary heat flow density q_u , following formula can be found:

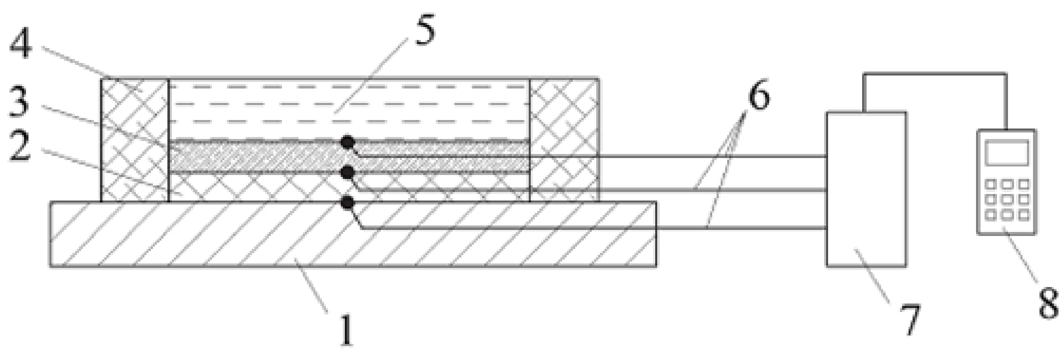
$$q_u = \frac{\lambda_{2qatlam(t_1-t_2)}}{\delta_{2qatlam}}, \text{Vt} / \text{m}^2$$

this here λ and δ - orgsteklo heat conductivity coefficients and thickness t_1, t_2 - as "heat source - orgsteklo layer" and "orgsteklo layer - being tested sample" temperature.

Thickness $\delta = 0,5$ mm. copper plate heat conductivity $\lambda = 384$ Vt / (m · ^{o} S).

Research during equipment indicators stabilization for his all parts "heated get" and heat flow transmission stationary quote for thermocouple sensors indicators 0.5 hours for 5 minutes range scale seen. Shown in picture 4 from the graph equipment indicators from 15 minutes then stationary that see possible.

To calculate the individual error of the thermocouple sensors, before starting the experiments, the temperature of each sensor immersed in a Dewar vessel filled with melted ice was measured and the temperature deviation from 0 °C was taken into account during the experiments.



Picture 3. Schematic diagram of a device for determining the thermal conductivity of a liquid thermal insulation coating.

1 - stationary heat flow source; 2 - layer of concrete material with thickness and thermal conductivity (orgsteklo mm, W / (m °C); 3 - layer of thermal insulation coating; 4 - thermal insulator (foam); 5 - "cooler" (filled with water) capacity); 6 - chromel copel thermocouples made of mm thick wire; 7 - switch; 8 - thermocouple readings.

To determine the reliability of the equipment for measuring the thermal conductivity of thermal insulation paint, initial tests were carried out.

Instead of the 3rd layer in the device (picture. 3), an orgsteklo plate similar to the 2nd layer in terms of size, thickness and thermal conductivity was placed and its thermal conductivity was measured. The measurement results showed that the thermal conductivity of the tested orgsteklo plate $\lambda = 0,186$ was equal to W / (m .(C ° 0In this case, the error of the method of determining the thermal conductivity:

$\Delta = \frac{0,19 - 0,186}{0,19} 100 = 2,1\%$ and this error does not exceed the error given in GOST (± 3%) and indicates the correctness of the selected research scheme.

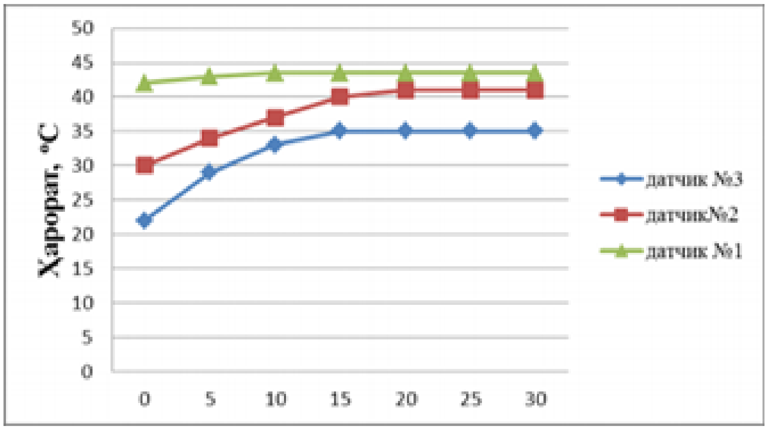
Based on the research, we can give the following advantages:

- easy to cover (edge), roller and compressor with sprinkle through instead increases to be);
- size big not compactness reach;

- To nature and man to health harm failure to deliver;
- alkalis to acids raw good resistance show to receive;

"To the fire" durable material. There are two other types of resistance that are specific to liquid insulation: temperature and humidity and resistance to ultraviolet radiation. The composition of liquid thermal insulation includes only environmentally friendly components, which allows it to be used indoors and outdoors, in children's institutions, public catering establishments, etc. without restrictions on their functionality.

It is very easy to apply even to complex areas . There are several ways to apply liquid thermal insulation to the surface you choose. You just have to choose the one that suits you best. You can use a variety of tools: brushes, rollers, and so on.



Picture 4. Indicators of the sensors of the three thermocouples of the equipment

The heat-insulating coating is thoroughly mixed with slow-moving mixers before application, depending on the type of application, a little ordinary distilled water or acrylic paint is applied. Before applying the coating, the surface is pre-cleaned, if necessary, chemicals are used.

If your surface is concrete, use a brush to clean it of dust, mold, and oil;

Agar metal if you push call spots if them phosphatizer accumulation with send recommended are given.

Board and wood products from application before wood primer and biocides with cleaning need.

If you surface again running if you are first in turn from salt to do need, then through the compressor sprinkle cover to the goal is compatible.

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